DPS-465

SERIAL DIGITAL VIDEO SYNCHRONIZER

Operator's Manual

Copyright Information

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The printed version of this document is DPS Part Number 707-465, revision 2.01.

Caveats

Information in this document is subject to change without notice and does not represent a commitment on the part of Digital Processing Systems, Inc.

This product requires technical and mechanical ability and requires precautions against electrostatic discharge. The user assumes all risks when this product is installed by anyone other than an authorized Digital Processing Systems dealer.

Table of Contents

Copyright Information i
- Copyright i
- Caveats i

Introduction 1

Chapter 1: Installation and Configuration 2

Installation 2
- Unpacking and Inspection 2
- Mounting 2

Configuration 2
- DIP Switches 2
- LCD Intensity 3
- DPS-465: Simplified Board Layout 4

Chapter 2: Video Connections 5

- The DPS-465: Back Panel 5

Inputs 5
- NTSC Video Input 5
- S-Video Input 5
- Component Analog Video Input 5
- Serial Digital D1 Input 5
- GPI 6
- Genlock Reference 6

Outputs 6
- NTSC Video Output 6
- S-Video Output 6
- Component Analog Video Output 6
- Serial Digital D1 Output 6

Remote Control Ports 7
- RS-232 7
- RS-422 7

Switches 7

KEYLOCK 7
TERM 7

Chapter 3: Operation 8

The DPS-465: Front Panel 8
The DPS-465: Front Panel Control Area 9

Proc Amps 9
VIDEO 9
BLACK 9
CHROMA 9
HUE 9
TIMING 10
MEM 10

Input Selection 11

Synchronizer Modes 11
Process 11
TSG 11
Bypass 11

Freeze Menu 11

Configuration Menu 12
1. Sync Mode (Composite Only) 12
2. Genlock Mode 12
3. Blanking Width 12
4. Hot Switch 12
5. Color / Monochrome 13
6. Video Out 13
7. Clamp Speed 13
8. Y/C Horizontal Delay 13
9. Y/C Vertical Delay 13
10. CAV In 13
11. CAV Out 13
12. D1 Clip Mode 14
13. EDH Mode 14
14. EDH RX Error Count 14
15. Remote Control 14
16. Unit Address 14
17. Genlock Adjust 14
18. GPI Function 14

19. D1 Edge Insertion 15
20. Baud Rate 15
21. VITS Field 1 15
22. VITS Field 2 15
23. DPS Software Version 15

Appendices 16

Appendix A: Specifications 17

Appendix B: Test Signals 19
Vertical Interval Test Signals (VITS) 19

Appendix C: Remote Control 20
Electrical Interface 20
Protocol 20

Appendix D: Important Addresses and Phone Numbers 26

Appendix E: A Brief History of DPS 28

Appendix F: Warranty 29
Warranty Statement 29
Warranty Limitations 29
Warranty Service 30

Appendix G: Compliance 31
FCC Compliance Statement 31

Introduction

The Digital Processing Systems DPS-465 Serial Digital Synchronizer is a 10-bit video synchronizer featuring serial digital and analog component, composite and Y/C input and output. It bridges the gap between analog video signals, such as satellite and microwave feeds, and a digital production facility. Four different input and output formats are provided:

- Serial Component Digital Video (D1)
- Component Analog Video (Betacam / MII)
- S-Video (S-VHS / Hi8)
- Composite Video

An adaptive comb filter and 10-bit CCIR 601 component processing provide maximum signal transparency. A built-in auto-switch TBC circuit enables the DPS-465 to handle heterodyne sources, such as camcorders.

The DPS-465 is also a transcoder and a digital test signal generator. In Test Signal Generator (TSG) mode, any one of 33 different test patterns appear at all four outputs. The operator can specify which test signals are used by the built-in Vertical Interval Test Signal (VITS) inserter.

CHAPTER 1:

INSTALLATION AND CONFIGURATION

Installation

Unpacking and Inspection

This unit has been thoroughly calibrated and inspected, both electronically and mechanically, to ensure that it meets the published specifications. The following items are included with each DPS-465:

Description	Quantity
DPS-465 Serial Digital Synchronizer	1
Operations Manual	1
AC Power Cord	1

Mounting

The size of the DPS-465 allows it to fit into most standard consoles or 19-inch racks. If the unit is to be mounted in a rack, then rack slides or trays must be used for support. Care must be taken to select a dry, well-ventilated location with a minimum of dust and vibration. Also, leave sufficient clearance from the unit's rear panel to allow for proper air circulation.

After unpacking the unit and before installing it in a console or rack, allow at least 30 minutes for temperatures to equalize and to eliminate any condensation that may have developed.

Configuration

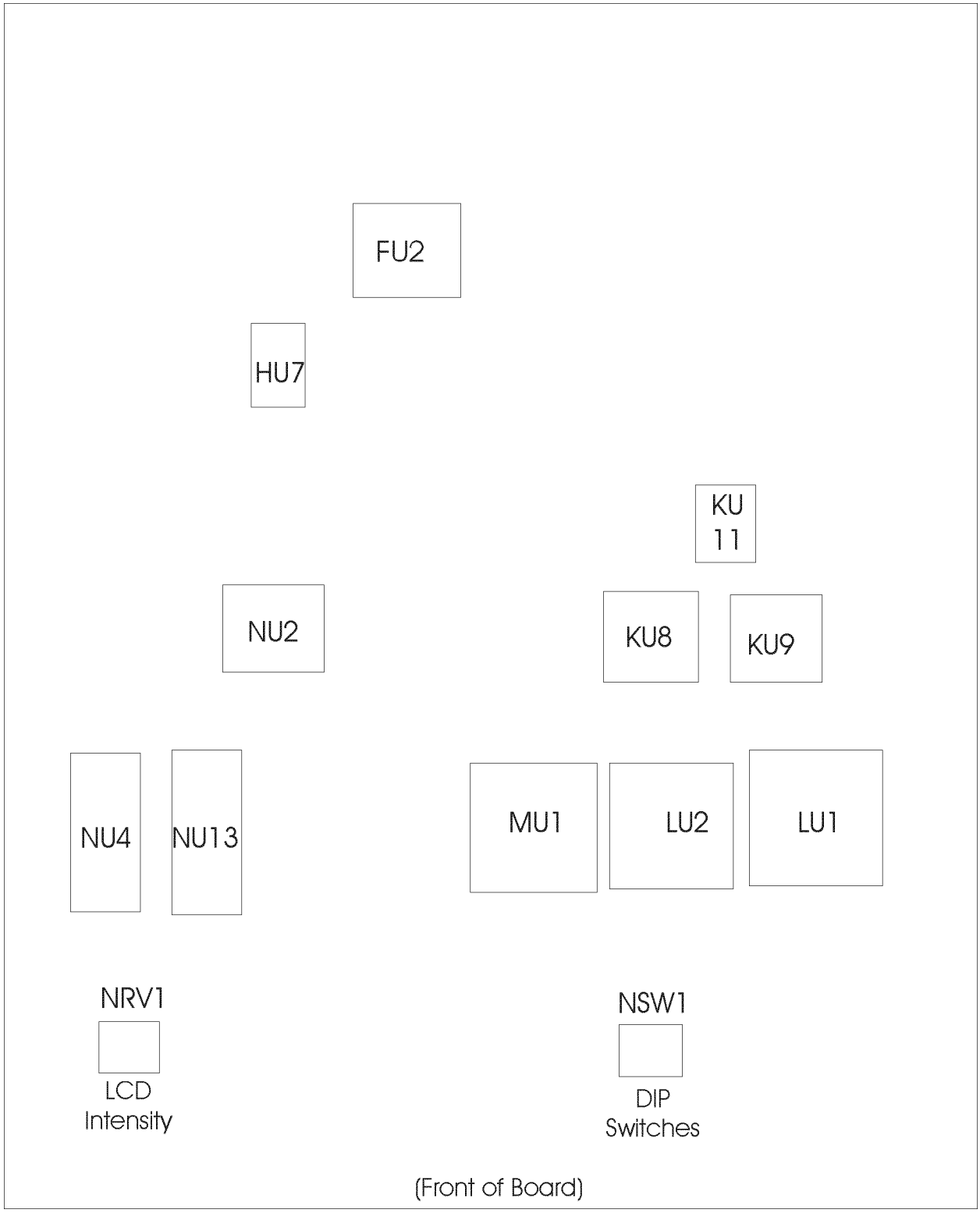
DIP Switches

There are four DIP switches located near the front edge of the DPS-465 board. They are all reserved for factory use and should not be changed.

LCD Intensity

To change the LCD intensity, the top cover must be removed. Remove the screws that secure the top cover to the chassis and lift off the cover. The LCD intensity adjustment will be visible behind the front panel near the front left corner of the board (see diagram, next page). Use a small flat-head screwdriver to set the desired intensity.

DPS-465: Simplified Board Layout

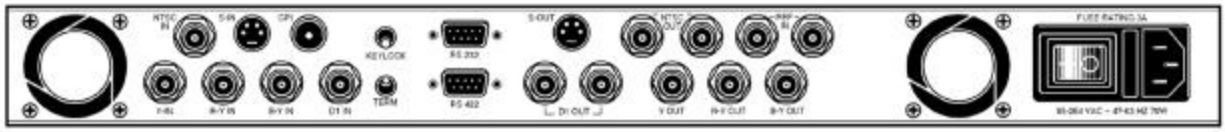


CHAPTER 2:

VIDEO CONNECTIONS

This chapter describes how to interface the DPS-465 with other video equipment in your system.

The DPS-465: Back Panel



Inputs

NTSC Video Input

This BNC connector, labeled *NTSC IN*, is used to feed composite 1 Vp-p NTSC video to the DPS-465. In Synchronizer Mode the input video signal can be direct color or monochrome; in Timebase Corrector Mode the input signal can be connected to the video output of a VCR.

S-Video Input

This 4-pin connector, labeled S-IN, is used for S-Video signals, like S-VHS or Hi8. It is normally connected to the S-Video output of a playback VCR using a standard 4-pin-to-4-pin S-Video cable. Some JVC 'industrial' type S-VHS players use a 7-pin connector for their S-Video output. To interface with such machines, a 7-pin-to-4-pin adapter cable is required.

Component Analog Video Input

These BNC connectors, labeled *Y-IN*, *R-Y IN*, and *B-Y IN*, are used to input the signals from analog component devices, such as a Betacam cameras or VTRs.

Serial Digital D1 Input

This BNC connector accepts serial digital CCIR 601 component video data at a rate of of 270 megabits per second.

GPI

This RCA connector is for the input of General Purpose Interface (GPI) signals, used to remotely activate the Freeze function of the DPS-465.

Genlock Reference

These BNC connectors, labeled *REF IN*, are used to loop a genlock signal through the DPS-465 to establish the timing for its video output signal. The signal for this input must always be stable, such as the output from a black-burst or color-bar generator. Do not attempt to use a signal that has not been timebase-corrected. When a valid signal is connected to the *REF IN* input, the video output of the DPS-465 will be genlocked to this signal. When no external reference is supplied to the genlock input, the DPS-465 will operate using its own internal sync generator.

Outputs

NTSC Video Output

These BNC connectors, labeled *NTSC OUT*, provide a synchronized/timebase-corrected version of any of the input signals, except when the DPS-465 is in either Bypass or TSG mode (for a discussion of the output of these modes, see the “Synchronizer Mode” section in Chapter 3).

S-Video Output

This 4-pin connector, labeled *S-OUT*, provides the synchronized/timebase-corrected S-Video version of the video input signal.

Component Analog Video Output

These BNC connectors, labeled *Y-OUT*, *R-Y OUT*, and *B-Y OUT*, provide the synchronized/timebase-corrected analog component video output.

Serial Digital D1 Output

These BNC connectors, labeled *D1 OUT*, provide the synchronized/timebase-corrected serial digital CCIR-601, 270 megabits-per-second output.

Remote Control Ports

In addition to remote triggering of the Freeze function via the GPI interface all functions of the DPS-465 can be remotely controlled by devices capable of either RS-232 or RS-422 control. The type of control is selected in the Configuration Menu, under the Remote Control sub-menu (see Chapter 3, “Operation”). If the Unit Address is set to an address of 1-127 (the allowable range), then the DPS-465 will respond only to commands which have an address field that matches the set address.

RS-232

This DB-9F connector enables the DPS-465 to be remotely controlled via the RS-232 interface.

RS-422

This DB-9F connector enables the DPS-465 to be remotely controlled via the RS-422 interface. The audio steering pulse is on Pin 5 of this connector.

Switches

There are two toggles switches on the back panel, labeled *KEYLOCK* and *TERM*.

KEYLOCK

When this switch in the down, or lock position, none of the front panel keys will function.

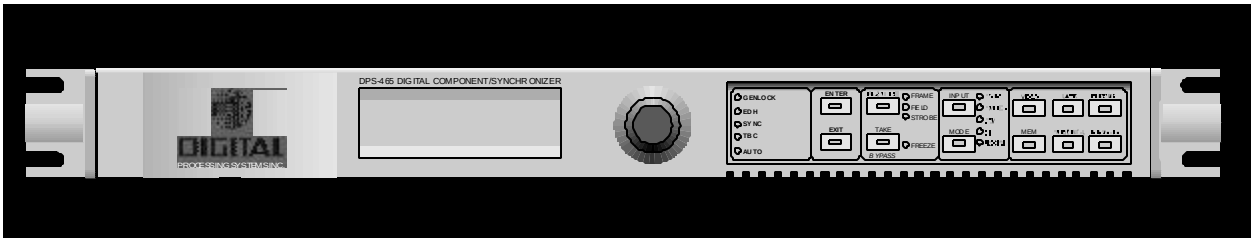
TERM

This switch terminates to RS-422 receive signal. Engage it when more than one unit is connected to the DPS-465 via RS-422.

CHAPTER 3:

OPERATION

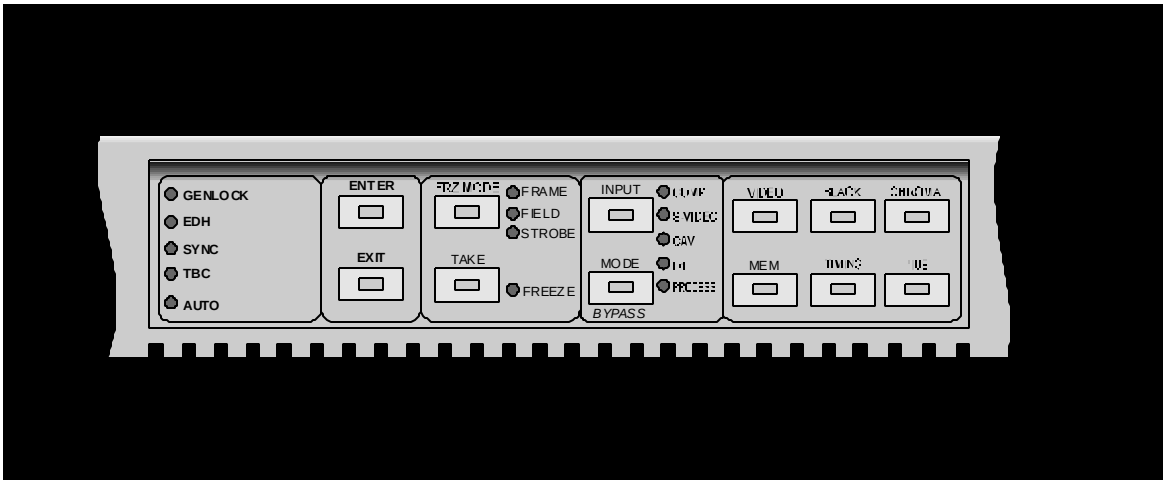
The DPS-465: Front Panel



The operation of the DPS-465 is organized into five main functional areas:

- Proc Amps
- Input Selection
- Synchronizer Mode
- Freeze Menu
- Configuration Menu

The DPS-465: Front Panel Control Area



Proc Amps

VIDEO

Pressing this button enables the luminance amplitude to be changed by rotation of the control knob. The range is approximately +/- 30 percent.

BLACK

Pressing this button enables the black level to be changed by rotation of the control knob. The range is approximately +/- 143 mV.

CHROMA

Pressing this button enables the chrominance amplitude to be changed by rotation of the control knob. The range is approximately +/- 50 percent.

HUE

This control enables the output phase to be changed by rotation of the control knob. The range is approximately +/- 45 degrees. Hue cannot be adjusted in D1 or CAV modes.

TIMING

Adjusts the horizontal position and genlock timing. Adjustments are for:

- Horizontal Fine: increments of 2.314 ns
- Horizontal Coarse: increments of 74.074 ns
- Range: +/- 9.5 µs

- Subcarrier Fine: increments of 0.175 degrees
- Subcarrier Coarse: increments of 1.406 degrees
- Range: 0 - 360 degrees

The range for Horizontal adjustments is +/- 9.5 us; for Subcarrier adjustments it is 0 - 360 degrees. To make adjustments, press the Timing button. Use the Timing button to cycle through the above selections, then use the control knob to select the exact timing.

MEM

The Memory button accesses the Store and Recall functions.

Store

Allows the current Proc Amp settings to be stored in the memory location selected using the control knob. Up to 9 settings can be stored, containing information on Video, Black, Chroma and Hue. Valid Store locations are numbered 1 - 9; location 0 is reserved for factory presets. To store a Proc Amp setting:

1) Press the *MEM* button
2) Use the control knob to select Store and press the *MEM* button again
3) Use the knob to select a memory location and press *MEM* again

Recall

Allows previously stored Proc Amp settings to be recalled. To recall:

1) Press the *MEM* button
2) Use the control knob to select Recall and press *MEM* again
3) Use the knob to select the desired memory location and press *MEM* again

(To abort, press any other Proc Amp control button before completing step 3.)

To recall factory presets, press the *MEM* button three times in succession. (Note: the *MEM* button cannot be used while in the Configuration Menu.)

Input Selection

The current (active) input selection is shown by the LED indicators, not on the LCD panel. Inputs are selected by pressing the *INPUT* button and using the control knob to select an input.

Possible inputs are:

- Composite
- S-Video
- CAV (Component Analog Video)
- D1 (Serial)

A flashing LED indicates that video is not present at the selected video input.

Synchronizer Modes

In Synchronizer Mode, there are three choices of operation:

- Process
- Test Signal Generator (TSG)
- Bypass

Process

Process is the normal mode of operation. It's LED will be lit when the synchronizer is active.

TSG

The DPS-465 has a selection of 33 test patterns. To use the 10-bit TSG Mode:

1) Press the *MODE* button once. The PROCESS LED will go out, TSG is enabled, and the LCD shows the active test signals.
2) Rotate the control knob to select a test signal.
3) Press the *ENTER* button to activate the selection.
4) To exit the TSG Mode, press the *MODE* button again.

(NOTE: while in TSG Mode only the *MODE* and *ENTER* buttons are active.)

Bypass

In Bypass Mode the NTSC IN video signal is bypassed to the NTSC OUT. To use this mode:

1) To enter Bypass, press and hold the *MODE* button until the *MODE* LED begins to flash (normally not less than two seconds). The composite bypass will be activated; no other signal will be bypassed.

2) To exit Bypass, press the *MODE* button once.

Freeze Menu

Press the *FRZ MODE* button to enter this menu. The following selections will show on the LCD:

- Freeze Frame
- Freeze Field
- Freeze Strobe

Press the *TAKE* button to activate your selection:

- if Frame mode is selected, the display indicates the current frame;
- if Field mode is selected, the display indicates the current field (1, 2, 3 or 4) and the control knob selects which field to display;
- if Strobe mode is selected, the display indicates the current strobe rate and the control knob allows the rate to be changed. The number displayed indicates the number of frames per update.

Configuration Menu

The Configuration Menu contains 23 different options, or sub-menus. They are listed below beginning with Sync Mode. The procedure to select and use any one of the sub-menus is the same:

1) To enter the Configuration Menu, press the *ENTER* button. The LCD panel will display the beginning of the menu.
2) Use the control knob to select one of the menus listed below, i.e., scroll through until the arrow (>) is pointing to the one you want. Press the *ENTER* button again to enter the menu.
3) Use the control knob to choose and activate the option you want.
4) Press the *EXIT* button to return to the beginning of the Configuration Menu, or,
5) Press any other control button to exit the Configuration Menu (except *MEM* and *TAKE*).

1. Sync Mode (Composite Only)

- *Synchronizer*: for this the input must be a stable, RS-170A signal (used for most satellite feeds).
- *TBC*: used for non-heterodyned signals (i.e., from a VTR).
- *Auto-Switch*: will sense the incoming composite video signal and select Synchronizer or TBC settings automatically.

2. Genlock Mode

- *Auto* (default): with an external genlock source, the front panel *GENLOCK* LED will be lit. If the genlock source disappears, the DPS-465 will automatically switch to Internal mode and the *GENLOCK* LED will flash.
- *Internal*: the unit will operate on its own internal crystal and the *GENLOCK* LED will be off.

3. Blanking Width

Sets the number of video lines blanked by the DPS-465 during the vertical interval.

- *Narrow* (default): vertical blanking ends at line 10 of field 1, and line 9 of field 2.
- *Wide*: vertical blanking ends at line 21 of field 1, and line 20 of field 2.

4. Hot Switch

- *Off* (default): automatic freeze is disabled.
- *On*: automatically goes into freeze mode whenever the input video signal is lost.
- *Drop to Black*: automatically goes into black output mode whenever the input video is lost.

5. Color / Monochrome

- *Color Mode* (default)
- *Monochrome*

For all outputs, selecting Monochrome places the DPS-465 into ‘Forced Monochrome’ mode where the chrominance picture detail is suppressed, and a black-and-white image is created. The color burst is still present.

6. Video Out

- *Normal* (default)
- *Force Black Out*: all outputs are forced to super-black.

7. Clamp Speed

Applicable to the COMP Synchronizer and the CAV input modes.

- *Normal* (default): the input video clamp is set to a ‘30-line’ time constant.
- *Fast*: the input video clamp is set to a ‘3-line’ time constant. This mode is used when hum is present on the input video signal.

8. Y/C Horizontal Delay

The control range is from -592 ns to +518 ns, in 74 ns increments. The factory default setting is 0 ns delay. (Does not affect D1 input.)

9. Y/C Vertical Delay

The control range is from -2 lines to +1 line. The factory default is 0 lines. (Does not affect D1 input.)

10. CAV In

Selects component analog input format.

- *Beta In* (default)
- *MII In*

11. CAV Out

Selects component analog output format.

- *Beta Out* (default)
- *MII Out*

12. D1 Clip Mode

This feature applies only to serial digital outputs, and enables (or disables) a black clip level.

- *Enabled* (default): all levels below black – digital level 64 – are clipped.
- *Disabled*: digital levels below 64 are allowed.

13. EDH Mode

Error Detection Handling (EDH):

- *Poll Off* (default): disables EDH. Errors are not detected and reported, and the EDH LED is not lit.
- *Poll*: enables EDH and lights the EDH LED. Input errors are detected, and reported in the "EDH RX ERROR COUNT" LCD. When errors are detected the EDH LED flashes.

14. EDH RX Error Count

A flashing EDH LED indicates that errors have been detected and not cleared. Actual error counts will be displayed as:

- *AP*: for the active picture.
- *FF*: for a full field.

To clear the error count, press the *ENTER* button and then the *EXIT* button. The counter will be reset and the LED will stop flashing until the next error is detected.

15. Remote Control

Selects the remote control interface.

- *RS-232 In*
- *RS-422 In*

Whichever input type is selected, a valid controller must be connected to the correct DB-9 plug on the back of the DPS-465.

16. Unit Address

Selects the DPS-465's unit address, for remote control purposes. The DPS-465 can be controlled remotely by the RC-2001 universal studio remote, the RC-2000 desktop remote, or PC-based custom remote software. Allowable address selections are from 1 to 127.

Each installed TBC has an address setting. The factory default setting for the first TBC is unit 1, for the second (if installed) unit 2, and so on. However, addresses don't have to be sequential.

17. Genlock Adjust

This menu item allows you to disable the genlock adjustment. It locks in the current setting, so that it cannot be changed inadvertently.

- *Enabled* (default): genlock adjustment is allowed.
- *Disabled*: genlock adjustment is not allowed.

18. GPI Function

- *Disabled* (default): no effect on the Freeze function.

- *Enabled*: Freeze function is controlled in this mode (i.e., Freeze/Live).

19. D1 Edge Insertion

When the DPS-465 is in input mode, this control allows you to add a soft transition from super-black to setup on the analog inputs. (Setup is always added to the analog outputs in D1 input mode.)

- *Enabled*
- *Disabled*

20. Baud Rate

Enables you to change the remote port data rate.

- 9600 bps
- 38,400 bps

21. VITS Field 1

The Vertical Interval Test Signals (VITS) menu has two areas in which to make selections:

- *LN#*: specifies the number of the line in field 1 for the insertion of the test signal. The choices available for LN# are OFF, 16, 17, 18, 19.
- *PAT#*: specifies one of the eight test signals for insertion. The choices available for PAT# are 01 to 08.

One test signal can be inserted into one of the four lines; a field can contain only one test signal. (See Appendix B for the test signals available.)

22. VITS Field 2

Same as above, for field 2.

23. DPS Software Version

This menu item displays the current software version.

APPENDICES

Appendix A: Specifications

Signal Processing ..... Component, 10-bit, CCIR 601 (13.5 MHz)

Synchronizing Range ..... Infinite

Frequency Response:
- Synchronizer ..... +/- 0.5 dB (0 - 4.5 MHz)
  ..... - 1dB (4.5 - 5.5 MHZ)
- TBC ..... - 3 dB (4.2 MHZ)
  (notch @ 3.58 MHZ)

Signal to Noise:
- Serial D1 I/O ..... > 70 dB Luminance Weighted
- Component Analog In ..... > 66 dB Luminance Weighted
- S-Video In ..... > 58 dB Luminance Weighted
- Composite Video In (Synchronizer)..... > 60 dB Luminance Weighted
- Composite Video In (TBC) ..... > 58 dB Luminance Weighted

Differential Phase:
- Sync ..... < 1% @ 1V p-p Modulated Ramp
- TBC ..... < 2% @ 1V p-p Modulated Ramp

Differential Gain:
- Sync ..... < 1% @ 1V p-p Modulated Ramp
- TBC ..... < 2% @ 1V p-p Modulated Ramp

K-Factor (2T) (Synchronizer) ..... < 0.5%
K-Factor (2T) (TBC) ..... < 1 %

Luminance Jitter (TBC) ..... < 15 ns

Inputs:
- Composite Video (BNC) ..... 1 V p-p, 75 ohms
- Serial Digital D1 (BNC) ..... 75 ohms Auto EQ to 200M
- Component Analog Video
  - Y (BNC)..... 1 V p-p, 75 ohms
  - R-Y (BNC), B-Y (BNC)..... 0.7 V p-p (Betacam), 486 mV p-p (MII), 75 ohms
- S-Video (4P Mini-DIN):
  - Y ..... 1 V p-p, 75 ohms
  - C (Burst Level) ..... 286 mV NTSC, 75 ohms
- Genlock Reference (BNC x2 Loop) ..... 1 V p-p, 75 ohms
- GPI Freeze Trigger (RCA) ..... TTL or Contact Closure

Outputs:

Composite Video (BNC x2)	1 V p-p, 75 ohms
Serial Digital D1 (BNC x2)	75 ohms Auto EQ to 250M
Component Analog Video	
Y (BNC)	1 V p-p, 75 ohms
R-Y (BNC), B-Y (BNC)	0.7 V p-p (Betacam), 486 mV p-p (MII), 75 ohms
S-Video (4P Mini-DIN):	
Y	1 V p-p, 75 ohms
C (Burst Level)	286 mV NTSC, 75 ohms
Audio Delay Sync (RS-422 DB-9F)	
Pin-5	Controls DPS AS-2400 through remote connections
Pin 1	Ground

Processor Controls:

Video Level	+/- 3 dB
Black Level	+/- 20 IRE
Chroma Level	+/- 6 dB
Hue Phase	+/- 45 degrees
Horizontal Genlock Timing	+/- 9.5 usec
Subcarrier Genlock Timing	360 degrees
Y/C Horizontal Delay Adjustment	-592 ns / +518 ns
Y/C Vertical Delay Adjustment	+1 / -2 Lines

Test Signal Generator Mode (All Outputs)	Select from 32 10-bit Test Patterns
VITS / VIRS Inserter	Select any two (line repetitive) test patterns to display on alternate fields of lines 16 - 19.

Remote Control Ports:

RS-232 Port (DB-9F)	RS-232 Levels @ 9.6/38.4 kb/s
RS-422 Port (DB-9F)	RS-422 Levels @ 9.6/38.4 kb/s

Size (W x H x D)	17” x 1-3/4” x 20” (43.2cm x 4.4cm x 50.8cm)
Power Requirements	100-240 VAC, 50/60 Hz, 70 Watts

Appendix B: Test Signals

Following are the test signals available with the DPS-465:

1. SMPTE Bars
2. EIA Bars
3. FF Bars
4. Bars / Luma
5. Bars / Reverse
6. Bars / Red
7. Bars 100 %
8. Super Black
9. Black
10. Gray
11. White
12. Luma Ramp
13. Mod Ramp
14. Luma 5-Step
15. Mod 5-Step
16. Y-Shallow Ramp
17. Shallow Ramp
18. Multiburst-60
19. Luma Sweep
20. Chroma Sweep
21. Pulse & Bar
22. NTC7 Composite
23. NTC7 Combination
24. FCC Composite
25. VIRS
26. Cross Hatch
27. SIN (X) / X
28. Red Field
29. Timing Bowtie
30. Matrix-1
31. Matrix-2
32. FF Bounce
33. 90 % Bounce

Vertical Interval Test Signals (VITS)

1. Full Field Bars
2. Multiburst-60
3. Luma Sweep
4. Chroma Sweep
5. Pulse & Bar
6. NTC7 Composite
7. NTC7 Combination
8. FCC Composite

9. VIRS

Appendix C: Remote Control

This appendix describes the serial data interface to the DPS-465. This information is intended for users and programmers who want to develop their own custom control (driver) software for the card. An example of a custom application would be a special driver for a computer-based editing controller which could poll and manipulate Proc-Amp parameters in order to store these values as part of an edit decision list.

Electrical Interface

The electrical interface for the DPS-465 is RS-232 and RS-422. The bit rate is set to 9600 BPS, with 8 data bits, 1 stop bit and no parity.

Protocol

The software protocol is a MIDI compatible format, using the system exclusive feature of the MIDI interface. Communication with the DPS-465 is initiated when the system exclusive command byte (F0 hex) is received, followed by the ID code (67 hex).

The next byte sent is the address byte, which determines which unit is being addressed by the command. This is followed by a unit function select byte and one or more data bytes. The communication is completed when the MIDI end system exclusive byte is sent (F7 hex).

The following table summarizes the protocol:

Host:

System Exclusive Byte (= F0 hex)
Unit ID Byte (= 67 hex)
Unit Address Byte (= 00-7F hex)
Function Select Byte (= 00-7F hex)
Data Byte 1
Data Byte 2
...
Data Byte N
End System Exclusive (= F7 hex)

Unit Response:

ACK Byte (= 06h) or NACK Byte (= 15h)

System Exclusive Byte

This byte is used in the MIDI protocol to allow manufacturers of MIDI equipment to define messages specific to their own equipment. The system exclusive mode remains in effect until the end system exclusive command is sent.

Unit ID Byte

This byte is the unique code which identifies the exclusive data for the particular unit.

Unit Address Byte

This byte determines to which DPS-465 the following command is directed. The address of each unit can be set using the front panel menu commands. Unit addresses correspond to hex codes as specified in the following table:

DPS-465 Unit Address	Corresponding HEX Value
Unit 1	01 HEX
Unit 2	02 HEX
Unit 3	03 HEX
Unit 4	04 HEX
Unit 5	05 HEX
.....	.....
Unit 126	7E HEX
Unit 127	7F HEX

Unit Function Select Byte/Data Byte(s)

The Function byte determines which function on the addressed card will be affected by the command. Most commands follow this byte with two characters that represent the new hex value for the selected function. The following table lists each function with the associated data bytes.

Function Byte	Data Byte(s)	Description
01h	2 (0,0-F,F)	Set luminance level command 00 = Minimum luminance level FF = Maximum luminance level
02h	2 (0,0- F,F)	Set black level command 00 = Minimum black level FF = Maximum black level
03h	2 (0,0-F,F)	Set chroma level command 00 = Minimum chroma level FD = Maximum chroma level FF = Maximum

Function Byte	Data Byte(s)	Description
04h	2 (0,0-F,F)	Set hue command 00 = -45 degrees FF = +45 degrees
08h	1 (0-3)	Input mode select 0 = NTSC input mode 1 = S-Video input mode 2 = Component input mode 3 = D1 input mode
0Ch	1 (0-1)	Freeze/Live mode select 0 = Live mode 1 = Freeze mode
0Dh	0	Request TBC brief status info.
0Eh	0	Request TBC full status info
12h	2 (0,0-7,F)	Strobe Rate 00 = Full Motion 7F = 127 Frames
13h	1 (0-2)	Select Freeze Mode 0 = Frame mode 1 = Field mode 2 = Strobe mode
14h	1 (0-3)	Freeze Field Select 0 = Select field 0 1 = Select field 1 2 = Select field 2 3 = Select field 3 4 = Select field 4
16h	1 (0-F)	Y/C Delay horizontal 0 = +518nS 8 = 0 F = -592nS
19h	2(0,0-2,0)	Select TSG Pattern
20h	2 (0,0 - 0,8)	Subcarrier Timing Fine Each Increment = 0.175 degree
21h	2 (0,0 - F,F)	Subcarrier Timing Coarse Each Increment = 1.406 degree
22h	2 (0,0 - 7,F)	Horizontal Timing Fine Each Increment = 2.314 nsec
Function Byte	**Data Byte(s)**	**Description**

23h	2 (0,0 - 7F)	Horizontal Timing Coarse Each Increment = 74.074 usec
24h	1 (0-3)	Y/C Delay vertical 0 = +1 line 1 = 0 2 = -1 line 3 = -2 lines
25h	1 (0-1)	Monochrome Mode 0 = Normal 1 = Chroma Off
28h	1 (0-2)	Set CAV Input Mode 0 = Beta In 1 = MII In
2Fh	1 (0-1)	Set CAV Output Mode 0 = Beta Out 1 = MII Out
37h	0,1	Function 00 = Process 01 = TSG One 02 = Bypass Mode 03 = Not Allowed
	2,3	Sync Mode 00 = Synchronize 01 = TBC 02 = Auto Switch 03 = Not Allowed
	4,5	Hot Switch 00 = Off 01 = On 02 = Drop To Black
	6	Genlock Mode 0 = Auto Genlock 1 = Internal
	7	Blanking Width 0 = Narrow 1 = Wide

Function Byte	Data Byte(s)	Description
39h	0	Video Out 0 = Normal 1 = Force All Outputs to Black
	1	Clamp Speed 0 = Normal 1 = Fast
	2	GPI Freeze 0 = Not Enabled 1 = GPI Enabled
	3,4,5,6,7	Not Used

Read/Write Memory Commands. The following commands allow you to directly read/write from/to the DPS-465 memory and register (reg) settings. For details of register location and function contact DPS.

30h	2 reg address bytes + 2 reg value bytes	Write register file
31h	2 reg address bytes + 2 reg value bytes	Read register file DPS-465 will send reg contents in binary + ACK (06hex)
1E	4 reg address bytes	Read non-volatile memory DPS-465 will send reg contents in binary + ACK (06hex)
1F	4 reg address bytes + 2 reg value bytes	Write non-volatile memory

(NOTE: All register address and value bytes are in ASCII.)

Brief Unit Status

Command 0D is used to request status information from the DPS-465. The DPS-465 responds with the following status byte (followed by the normal ACK byte).

Bit 7	Always 0	
Bit 6	(Genlock Status)	1 = Genlocked 0 = Free-running
Bit 5	(Input Video Pres)	1 = Input present 0 = No Input present
Bit 4	(Freeze/Live Mode)	1 = Freeze mode 0 = Live mode

Full TBC Status

Command 0Eh requests a complete status dump from the addressed TBC. The status information consists of the brief status byte (see command 0Dh), followed by two ASCII characters for each of the Proc Amp and system phase settings. These represent the hex value of their current setting as indicated.

Byte	Description
1	Brief status byte (see command 0Dh)
2	MSN of Video Level
3	LSN of Video Level
4	MSN of Black Level
5	LSN of Black Level
6	MSN of Chroma Level
7	LSN of Chroma Level
8	MSN of Hue Level
9	LSN of Hue Level
16	MSN of Horizontal System Phase
17	LSN of Horizontal System Phase
18	MSN of Subcarrier System Phase
19	LSN of Subcarrier System Phase
20	MSN of Strobe Rate
21	LSN of Strobe Rate
22	MSN of Freeze Field
23	LSN of Freeze Field

Note: MSN = Most Significant Nibble (ASCII 0 - 9 or A - F); LSN = Least Significant Nibble

Programming Example

Some confusion has resulted from the fact that actual data bytes sent to the DPS-465 must be in ASCII. The following is an example of the actual data that would be sent to the DPS-465 to force it into monochrome mode. Please note that the data bytes are always transmitted in ASCII.

0xF0	MIDI Start of Exclusive
0x67	DPS ID
0xAA	AA = TBC Address
0x37	Forced Monochrome Function Select
0x31	= ASCII for “1”
0xF7	MIDI End of Exclusive

Note: Upon power-down, all settings are maintained in non-volatile RAM on the DPS-465.

Appendix D:

Important Addresses and Phone Numbers

Internet

ftp://ftp.dps.com
http://www.dps.com
Support E-mail:

Canada/International	support.ca@dps.com
U.S	support.us@dps.com
Europe	support.eu@dps.com
Asia-Pacific	support.au@dps.com

Suggestions: suggestionbox@dps.com

Canada/International

Digital Processing Systems, Inc.
70 Valleywood Drive
Markham, Ontario L3R 4T5

Toll-free: 800-775-3314
Voice: 905-944-4000
Fax: 905-944-4200
Customer Service Voice Mail: 905-944-4100

USA

Digital Processing Systems, Inc.
11 Spiral Drive, Suite 10
Florence, KY 41042

Toll-free: 800-775-3314
Voice: 859-371-5533
Fax: 859-371-3729

Europe

Digital Processing Systems, Ltd.
Romans Business Park, Unit 9
East Street, Farnham
Surrey, GU9 7SX
U.K.

Phone numbers are preceded by +44 1252 if calling from outside the U.K., and by 01252 if calling from inside the U.K.:
Voice: 718300
Fax: 718400

Asia and the Pacific Rim

DPS Asia Pacific
858 King Georges Road
South Hurstville, Sydney
N.S.W., 2221
Australia

Voice: 61-2-9547-0088
Fax: 61-2-9547-0988

Appendix E:

A Brief History of DPS

We were originally founded in 1975 as Digital Video Systems. DVS was a pioneer in the development of time base correctors (TBCs) and synchronizers. The company's first product, the DVS1 Time Base Corrector, was sufficiently ahead of its time that many of them are still being used today.

DVS was acquired by Scientific Atlanta in 1982 and the focus of the division shifted to satellite encryption technologies. In 1988, the studio video product line was spun off into a new employee-owned company called Digital Processing Systems (DPS). In 1996 DPS went public, with a very successful initial public offering (IPO) of over three million shares.

Today, while DPS continues to innovate and expand its line of traditional broadcast products, the company experiences significant growth in the computer video marketplace. DPS entered the computer video field in 1991 with the introduction of the DPS Personal TBC, the first infinite window TBC on a PC card. The DPS Personal TBC's combination of features, performance and price was unique, and competed with units selling for three times its cost. After the success of this TBC card, DPS followed with the Personal TBC II, III and IV, each of which provided increased features and performance. Another innovation was the DPS Personal VScope, the world's first combination waveform monitor/vectorscope on a PC card.

The DPS Personal Animation Recorder (PAR), a plug-in card which functions as a single-frame recording deck, was introduced soon after the first Personal TBC and quickly became one of our most popular products. Still selling in both PC and Amiga versions — a testament to how far ahead of the rest of the industry it was — the PAR provides component analog video (Betacam, MII), composite and S-Video (Hi-8/SVHS) outputs.

The DPS Perception Video Recorder (PVR) is a significant advancement beyond the PAR. First shipped in 1995, the multiple-award-winning PVR is a PCI-bus digital video disk recorder which features 10-bit video encoding with 2X oversampling, CCIR 601 4:2:2 processing and an integrated SCSI-2 hard drive controller. The PVR is also designed to integrate with third-party non-linear editing software.

Fulfilling the promise of the PVR to be "the heart of an advanced digital video workstation," DPS has built a family of products that work with the PVR to create a complete video-audio editing solution. These products include: the AD-2500/3500 Component Video Capture daughtercard; the SD-2500/3500 Serial Digital Video I/O card; the Perception F/X transition effects accelerator card; and the Perception Audio for Video (A4V) board.

A key contributor to the quality and remarkable capabilities of DPS's computer video products has been our lengthy experience in the broadcast studio field, and our traditional broadcast product line is still going strong. In the last year-and-a-half alone we introduced the DPS MicroSYNC-X 10-bit four-field video synchronizer card; the DPS MicroSYNC-AVX stereo audio/video synchronizer system; and the DPS-465 Serial Digital Video Synchronizer.

Digital Processing Systems' corporate headquarters and manufacturing facilities are in Toronto, Canada. Sales, service and distribution facilities for the United States are located in Florence, KY, adjacent to the Greater Cincinnati/Northern Kentucky Airport. A United Kingdom office oversees European operations from London, and Asia and Pacific Rim countries are serviced by our office in Sydney, Australia.

Appendix F: Warranty

Warranty Statement

Digital Processing Systems, Inc., warrants the original purchaser that this product is in good working condition for a period of two years from the date of purchase. Should this product, in Digital Processing System's opinion, malfunction within the warranty period, Digital Processing Systems, Inc., will repair or replace this product without charge. This warranty does not apply to those products which have been damaged due to accident, unauthorized alterations, repairs or modifications.

Warranty Limitations

All warranties for this product, expressed or implied, are limited to two years from the date of purchase and no warranties, expressed or implied, will apply after that period.

The distributor, its dealers and customers agree that Digital Processing Systems, Inc., shall not be liable for any loss of use, revenue or profit.

Digital Processing Systems, Inc., makes no other representations of warranty as to fitness for purpose of merchantability or otherwise in respect to any of the products sold to the distributor pursuant to this agreement.

The liability of Digital Processing Systems, Inc., in respect of any defective products will be limited to the repair or replacement of such products.

In no event shall Digital Processing Systems, Inc., be responsible or liable for any damages arising from the use of such defective products whether such damages be direct, indirect, consequential or otherwise and whether such damages are incurred by the distributor or third party.

Warranty Service

Units requiring repair under warranty may be sent directly to Digital Processing Systems, Inc. To obtain service under this warranty, first contact the Digital Processing Systems Customer Service Department to request a Return Material Authorization (RMA) Number.

- **Canada and International** (Country code) 905.944.4000
- **USA** (Country code) 859.371.5533
- **Europe** +44 1252 (outside the UK) or 01252 (inside the UK) followed by 718300
- **Asia - Pacific Rim** 61.2.9586.0088

The RMA number must be clearly displayed on the unit's external packaging. Units shipped without this number will not be accepted. Include proof of purchase (including date of purchase), a note outlining the problem and the RMA number.

IMPORTANT: When shipping your unit, pack it securely and ship prepaid and insured. Digital Processing Systems, Inc., will not be held liable for damage or loss to the product in shipment. Repaired items will be returned to the purchaser prepaid via a surface freight carrier of DPS' choice (within the continental United States). If another method of shipping is desired, it must be clearly specified in writing and all priority return freight charges are the responsibility of the purchaser.

Appendix G: Compliance

FCC Compliance Statement

This device complies with Part 15 of the FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received,
including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.